Remarks/Arguments:

Applicant wishes to thank the Examiner for his detailed comments. As Examiner has chosen to group his comments by section, Applicant shall address each of these sections and points in turn.

Amendments to Specification:

Title:

The title of the application has been amended to re-introduce the word "IMPROVED", to now read "IMPROVED STABILIZATION STRUCTURE FOR CPP GMR/TV". This word has been in the title of the originally submitted application, and in the Declaration, Assignment and filing documents. It was dropped by the PTO for some reason, and never corrected until this point. This modification is made for the purpose of restoring the title to its original wording.

Claim Objections:

1. Examiner has stated:

> "The disclosure is objected to because of the following informalities:
> • In Specification, p. 7, line 13; "pinned layer 60" should be changed to --pinned layer 58--
> Appropriate correction is required.

The present amendments correct this problem by changing the number of the pinned layer from "**60**" to "**58**" as required.

Claim Rejections:

Claim Rejections - 35 USC § 112

2. Examiner has stated:

"...Claims 1-8 and 11 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

"Claim 1 recites "net magnetic moment dM=O." However, Applicant has define M as `magnetic magnetization" in Specification, p. 9, line 1, and it is well known that the magnetization is the value of magnetic moment divided by volume. Therefore, it is not clear

that Applicant is to claim the differential of the magnetizations being zero or the net magnetic moment being zero."

The term "net magnetic moment" has been defined as Applicant intends to use it, and has used this term consistently throughout the specification and claims. The term, as the Applicant intends to use it, has been specifically defined in lines 8-15 of page 8, as follows:

"The thicknesses of the layers and the field strengths of the first paired layer **66** and a second paired layer **70** are preferably very close to each other, so that the two fields end up canceling each other out, as far as their external influence on the other layers is concerned. This cancellation is referred to as having a net magnetic moment near zero, notated as dM=0...."dM=0", means that the differential in field strengths is zero between the two layers and the net result is very near zero field strength."

Applicant has used the term "net magnetic moment" consistently throughout, and there should be no confusion in the minds of those skilled in the art as to its meaning. Applicant thus respectfully asserts that the rejection is unfounded and requests that it be withdrawn as to Claim 1, and to Claims 2-8 with depend from Claim 1.

Examiner has further stated:

"Claims 3 and 11 recite "dM=O corresponds to dT less than 5 x 10-^{10} meters, where magnetic thickness T = M x t, and M equals magnetization, t equals recited by Applicant in Specification, p. 9, line 1 that M has unit of emu/cm3; therefore, dT should have unit of emu/cm^2; rather than unit of meter. It is not clear what Applicant intends to claim.

"It makes any person skilled in the art to which it pertains, or with which it is most nearly connected cannot make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

"Claims 2-8 are rejected for their dependence from claim 1."

Applicant points out that the concept of "magnetic thickness dT" is a shorthand way of considering the difference in magnetism produced by layers of material in the read head. When calculating, the magnetic thickness T = M x t works out that for a given thickness of material, it will have a magnetization in units of emu/cm2.

In a stack of layers in a read sensor, the layers are all trimmed to the same dimensions, so the square area of each layer is approximately equal. Thus, assuming layers of same material and equal square area, any variation in magnetization will be due to the thickness of the layer **only**. In other words, the

square area of the layers in the read sensor is a constant, and can be thus taken as granted in the design of the sensor. Therefore, the dimensions of emu/cm2 are disregarded for design purposes, and only the thickness of the magnetic layers is referenced, as a shorthand, since it is the only remaining variable. As recited in page 8, line 21 through page 9, line 13 of the present specification:

"As a way of understanding the limitations of this term, it may be useful to discuss the difference in "magnetic thickness" or "dT" of these layers. For material with a certain value of magnetization M, having units of emu/cm^3 and of thickness of material t, having units of cm,

magnetic thickness T = M x t

thus having units of emu/cm^2. For 2 layers of material having the same magnetism M value, the difference in magnetic thickness dT will correspond to the difference in thickness of the layers. Thus, to achieve a dM very near zero, dT is preferred to be less than 5 Å (less than 5 x 10^{-10} meters). For ease of reference, the term dM=0 will be used in this discussion, with the understanding that it refers back to dT< 5 Å. As an example, the first paired layer **66** may have a thickness of 13 Å and the second paired layer **70** may have a thickness of 15 Å, so that the differential in thickness is 2 Å. If both layers are of the same material with the same magnetic properties, then the net magnetic moment can be modeled by the difference in the layers thicknesses, i.e. 2 Å, which is thus < 5 Å; and thus the net magnetic moment is very near zero."

Thus, it is easily apparent from the description that, as a shorthand, the difference of the thickness of the layers of magnetic material ("dT being less than 5 Å") is being used to describe how the net magnetic moment near zero ("dM=0") is produced. By having layers of the same square area and material, the difference in the thickness of the layers will determine if there is a difference in the volume of the layers, and thus if there will be a net magnetic moment between the two layers, and what its magnitude will be. All other variables being constant, if the thickness of the two layers are close enough to being equal, then the volumes will be close to equal, and the net magnetic moment will be very close to zero.

This is unambiguous and there should be no confusion in the minds of those skilled in the art as to its meaning. Applicant thus respectfully asserts that the rejection is unfounded and requests that the rejection be withdrawn as to Claims 3 and 11.

Applicant thus respectfully requests that the rejection be withdrawn as to Claims 1-8 and 11.

Claim Rejections - 35 USC § 102

3. Examiner has stated:

"Claims 1, 2, 4-6, 9, 10, 12-14, and 17-20 are rejected under 35 U.S.C. 102(e) as being anticipated by *Freitag* et al (US 6,741,432)....

"Claims 1 and 9, *Freitag* et al shows ...
"Claims 2 and 10, *Freitag* et al also shows ...
"Claims 4 and 12, *Freitag* et al further shows...
"Claims 6 and 14, *Freitag* et al further shows ...
"Claim 17, *Freitag* et al shows...
"Claim 18, *Freitag* et al shows...
"Claim 19, *Freitag* et al shows...
"Claim 20, *Freitag* et al shows..."

It has been noted and admitted by the Examiner in a telephone interview of 10/13/2006 that Examiner has mixed up two of the reference numbers used in this Office Action. He has referred to *Freitag* (US 6,741,432) repeatedly in the above discussion. However, the provided reference for *Freitag* actually corresponds to **US 7,038,889**, and *Pinarbasi* actually corresponds to **US 6,741,432**. Examiner has agreed to this interpretation and has also agreed to publish an Interview Summary establishing these facts for the record. This revised correspondence of numbers has been assumed in the following discussions.

Applicant states for the record that Applicant does not agree with Examiner's main basis for rejection in *Freitag* et al. (US 7038889 B2). Examiner thinks pinned layer structure **824** (fig. 8) of *Freitag* is the same as in-stack bias structure **78** in the present application. However, structure **78** is not a pinned structure as shown by direction of magnetizations (**90, 88**) of layers **66** and **70** (fig. 5) of the present application. Instead, magnetizations are 90 degree to the pinned magnetizations (**86, 84**).

The structure shown in *Freitag* US 7038889 is thus a dual sensor with two stacks of pinned layers (**824** and **816**, fig. 8). Pinned stack **824** is NOT in-stack bias structure. The present inventor is also one of the named inventors in the *Freitag* reference and is quite familiar with the dual spin valve structure in *Freitag*. He is quite confident that *Freitag* does not disclose the present invention.

However, this point is moot, as Applicant has elected to follow the indications of allowable subject matter, as will be discussed below, and therefore need not argue the merits of the above rejections.

Claim Rejections - 35 USC § 103:

4. Examiner has stated:

"Claims 3, 7, 11, 15, and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Pinarbasi*" **(should be *Freitag*? -Applicant)** "in view of *Pinarbasi* (US 6,865,062).

"Claims 3 and 11, *Freitag* et al does not show the thickness of the layers. *Pinarbasi*

shows...

"Claims 7, 15, and 21; *Freitag* et al does not show that the pair of primary pinned layers are self-pinned layers. *Pinarbasi* shows a primary pinned layer..."

As stated above, it has been assumed in the following discussions that *Freitag* corresponds to US 7,038,889.

Applicant states for the record that Applicant does not agree with Examiner's rejection of the present application over *Freitag* US 7,038,889 in view of *Pinarbasi*.

The dual spin valve structure shown in *Freitag* US 7,038,889 is a dual sensor with two stacks of pinned layers (**824** and **816**, fig. 8) which is quite a different structure than that of the present invention. Pinned stack **824** is NOT in-stack bias structure. The addition of elements from *Pinarbasi* do not produce a configuration that resembles the present invention, and thus the combination of the references cannot be fairly said to make the present invention obvious in view of them.

However, this point is again moot, as Applicant has elected to include the stated allowable subject matter, as will be discussed below, and therefore need not argue the merits of the above rejections.

Allowable Subject Matter

5. Examiner has stated:

"Claim 8 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

"Claim 16 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

"• With regard to claims 8 and 16, as the closest reference, *Freitag* et al (US 6,741,432)" **(should be US 7,038,889 –Applicant)** "shows a read sensor including: at least one primary pinned layer; a barrier layer; a free layer; an in-stack biasing structure have zero net magnetic moment, which acts to stabilize the free layer by exchange coupling; but fails to show that the read sensor is of Current Perpendicular to the Plane (CPP) configuration.

"• Applicant asserts "the present invention that the overall thickness dimension of the read sensor is reduced, allowing the head to be made smaller" (Specification, p. 4)."

For the record, Applicant does not agree with the Examiner that *Freitag* shows:

"an in-stack biasing structure have zero net magnetic moment, which acts to stabilize the free layer by exchange coupling."

As discussed above, *Freitag* shows a dual sensor structure and not one with an in-stack biasing structure. However, Applicant does agree with the Examiner that among other differences between *Freitag* and the present invention, *Freitag* fails to show that the read sensor is of CPP configuration. This is verified, among other things, by the indication of the I_s current flowing in the Current In Plane (CIP) direction 801 in Fig. 8 of *Freitag*, and also the recital that

"Allowing the sense current to flow along a direction 801, 901 such that the sense current I_s reinforces flux guiding...causing the dual spin valve GMR sensor to be self-baised..."(*Freitag*, Col. 8, lines 47-55)

This also reinforces the point that there is no in-stack biasing structure in *Freitag*.

Currently amended Claims 1 and 9 both now contain the limitation from Claims 8 and 16 respectively, that they must include:

"a read sensor which is of Current Perpendicular to the Plane (CPP) configuration".

Thus it is thought that independent Claims 1 and 9 as amended now include subject matter which has been stated to be allowable, and that dependent claims 2-7 and 10-15 all include by their dependence allowable subject matter. Thus all Claims 1-7 and 9-15 are now allowable.

Claims 8, 16, and 17-21 have been cancelled, leaving only allowable Claims 1-7 and 9-15 in the case.

Conclusion:

Applicant has endeavored to put this case into complete condition for allowance. It is thought that the rejection under 35 USC § 112 were unfounded. It is thought that the current amendments have introduced subject matter which has been stated to be allowable either directly or by dependence into all remaining claims. Applicant therefore respectfully asks that the objection and rejections be withdrawn and that allowance of all claims presently in the case now be granted.

If the Examiner would like to discuss any of the points involved in the Response, he is urged to contact Applicant's Attorney at the numbers included below.

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